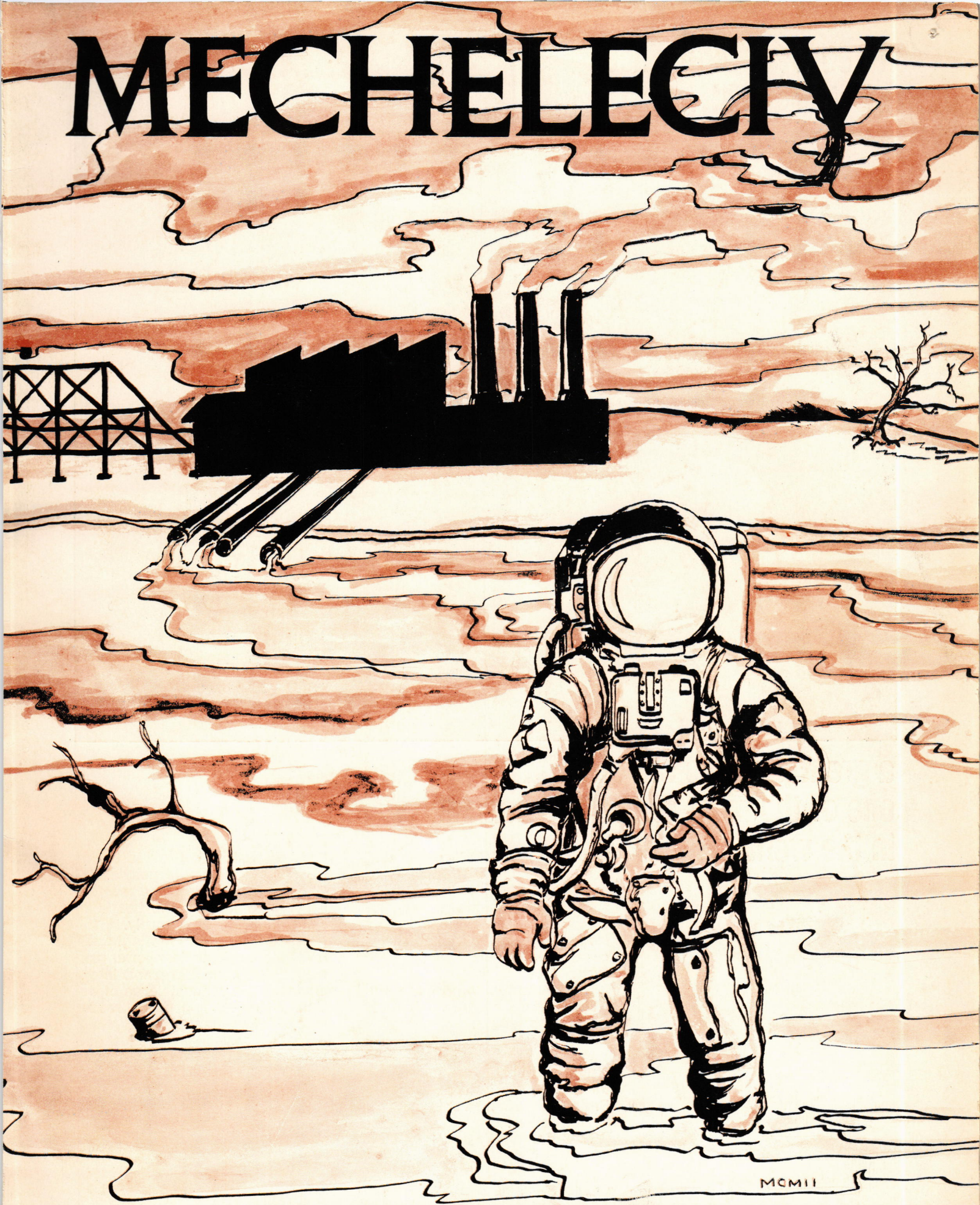
MECHELECIV



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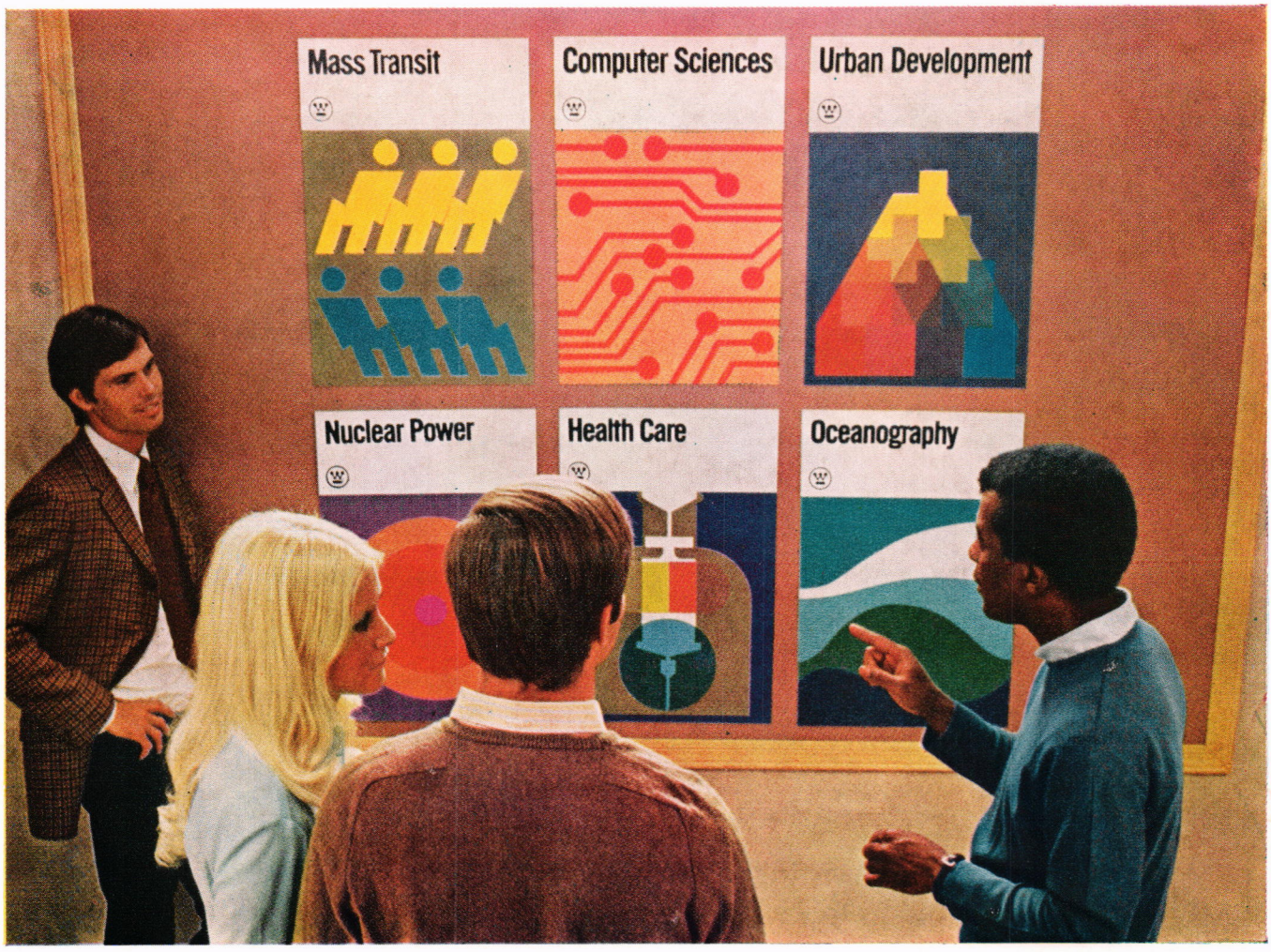

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MECHELECIV

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Illustrated by Steve Momii

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MECHELECIV

COMMITMENT TO ENVIRONMENTAL ACTION

Many people may think that the topic of environment has been written upon enough in the past year. So why is Mecheleciv wasting paper and money on a topic that has been discussed and researched by publications that are far more technical and expertise on the topic than we are?

One reason for an issue on environment is that we feel that if one person is made more conscientious in his thinking about the environmental problems of our world, the money and paper has not been wasted, but well spent.

Another reason is that today's engineering students must be made ever more aware of the environmental problems, since they will be responsible for the solutions to an ecological balance in the very near future. Engineers in all fields of study may be in positions very soon that will have a decisive voice in our nation's environmental policies and laws, so they must have data from many inputs if they are going to make sound engineering decisions in an area that can not allow a large margin of error or uneconomical design of the large environmental systems that are going to have to be made in the very near future.

One channel of environmental input will open up this November ninth through eleventh at George Washington University. The Society of Engineering Science will be holding a meeting on Environmental Engineering at the University Center. All engineering students have been invited on a space available basis.

This issue of Mecheleciv has been put together so as to show some different points of view on the environmental crisis and to present a few of the technological achievements in the battle against environmental pollution.

We of Mecheleciv hope that you find some food for thought in this issue, and better yet, some data for action.

Greg C. Eichert
Editor

LETTERS TO THE EDITOR

WHERE'S MECH MISS

Dear Sir:

I have noticed that the Mech Miss feature has been absent from several issues of your magazine.

Perhaps the editor has not realized the significance of this feature, especially to the non-engineers. For most non-engineers, this is the major reason for reading your magazine. Both men and women enjoy seeing which lovely young thing you have chosen each month. This campus does suffer from a definite lack of visible, good looking girls. Mech Miss makes visible one of the usually invisible, far-out chicks, and the men of this campus need all the help they can get, (in many ways).

This feature also has a great deal of significance to the girls of this university. It's good for a comparison; measure yourself against the month's Mech Miss. To be named as Mech Miss is a dream many girls keep from freshman year through senior year. To be Mech Miss is to be recognized as a sex symbol and since the demise of the Hatchet Honey, Mech Miss provides the only recognition of this kind. And this is a very important recognition.

May I recommend that the feature be reinstated? I would also like to see more biographical data included.

Betsy Boehaer—40-24-37

Dear Miss Boehaer,

Gee whiz! Thanks ever so much for your interest in our Mech Miss feature. I will be sending a photographer and reporter around to see you so that you may be considered for November's Mech Miss. Prepare yourself.

Editor

WE HAVE A HOME

We finally have a replacement for the Davis-Hodkins House! The new building is Building NN, located on Eye Street boarding on the parking lot between 20th & 21st Streets just a half a block from the Student Center. In addition, it is well equipped to meet the needs of our engineering students. For the past year Building NN has been used by our Transportation department and I have been assured that the building will be completely painted and remodeled to our satisfaction.

The decision to give us Building NN came in late June. Until this time Mr. Einbinder had been looking for a replacement stating that the engineers deserved an adequate meeting place. I have assured him that Building NN would be most satisfactory.

Plans for moving into our new house is scheduled for October pending some Zoning procedures.

Donald F. Wallroth, President
Engineers Council

THINGS HAVEN'T CHANGED

Dear Sir:

It must have been a slow day in our house when the April 1970 issue surfaced in late August. I read the editorial. Obviously, by the existence of this missive, it evoked response and caused a chain reaction of memories.

First of all, I had empathy for the writer of that editorial who questioned the action of the Engineers' Council which, when asked by Dr. Hyman to address itself to the issues facing citizens and students today, chose to debate the price of hot dogs for a luncheon. I suppose I was

LETTER TO THE EDITOR POLICY. The opinions set forth in the "Letter to the Editor" page of this magazine are not necessarily the opinions of the staff of *Mechelecіv* magazine. This page is set aside each issue for use by students, alumni, faculty, and staff of the School of Engineering and Applied Science. The staff will also accept letters from other sources if the letters concern the magazine or would be of interest to the students, alumni, faculty, and staff of the S.E.A.S. *Mechelecіv* reserves the right to edit any letter if lack of space deems it necessary. If, in the opinion of the Editorial Staff of *Mechelecіv*, a letter appears to be unprintable, the staff reserves the right to return the letter to the sender stating the staffs' reasons for withholding it from publication. All letters must be signed; however, pen names may be substituted if requested.

pleased to see that one small voice (the editor's) was raised to combat the apparently correct idea that engineers, students and practitioners alike are untouched or rather, try to ignore the issues that are rending the fiber of this country.

Memories of the days that a few of us started the *Mechelecіv* using some borrowed paper and a ditto machine came back to me. I don't think we were concerned with the war, the great issue of THAT day but we were trying to find literate engineers (believe me, that's tough") and trying to forge unity between engineers and offer them a voice. As editor of *The San Francisco Engineer,* a monthly newsletter for most of the engineering societies of this area which became *The Grid,* I did pretty much the same thing.

I gathered from the editorial that the Engineers' Council hasn't changed in 25-30 years since I was a member of it as Regent of Theta Tau, etc. But, as individuals outside the Engineering School, some of us acted. Picketing of G.W.! Unheard of until a group of us were shocked by G.W.'s not allowing a Black who, if my memory is correct, was a professor from Howard University, to enter a commercial show put on in Lisner. Imagine that! A university in the Nation's Capitol, not allowing a black man into a university building, even though he bought a ticket for a commercial activity. Engineering students and liberal arts students joined Ingrid Bergman, I believe, in picketing her own play which followed the first incident.

I suppose the moral of this too-long letter is that I urge editors of the Mechelecіv keep crying in the wilderness, hope for the best and expect nothing and realize, that despite the Engineers' Council, things do change and sometimes for the better.

Sincerely yours,
Alfred H. Barauck, P.E.
856 Southhampton Drive
Palo Alto, California

Dear Editor:

Congratulations on tackling such an important concept as the meaning of leadership in your April, 1970 editorial. However, there were several inaccuracies in that editorial regarding my motives and actions.

You suggested that my reason for attending the May Engineers' Council meeting was to convince the Council to take a position regarding the events of last May. The truth is that my attendance at the meeting was in response to an invitation by the incoming President, Don Wallroth, an invitation which was extended (and accepted) prior to the Cambodian adventure.

The statement that I "proposed that the Engineers' Council . . . take and make known some formal position . . ." is inaccurate. My suggestion, as I recall it, was that the Council *consider* taking a position. You seem to agree with this interpretation later on in the fifth paragraph of your editorial, where referring to the Council's reaction, you state that they "decided not to consider considering to take a stand . . ." Also, I prefaced my suggestion by remarks concerning my observations of the lack of responsible student leadership during the crucial weeks (the university-wide student government having dissolved itself earlier in the spring), and that perhaps what was needed was a group of elected student representatives to make themselves heard.

You erred in assuming that my opposition to our country's involvement in Vietnam and Cambodia is related to my feelings about President Nixon. In fact my opposition to U.S. intervention in Indo-China was just as strong through the Johnson administration, and the last year of the Kennedy administration. I was as much as "sometime activist" in 1963 as I am now!

Barry Hyman
Associate Professor

Dear Sir:

The first few weeks of college for an entering freshman can be very trying and always confusing. Some freshmen, those with foresight, arrive a week before registration. This allows them to become used to G.W. life. All freshmen, except those who are well-informed and have pre-registered, face an incredible array of procedures, forms, blue cards, green cards and data processing cards. Of course, anyone who has not pre-registered ever gets all the classes he wants. I didn't get a single one. However, what they do get is a grueling obstacle course from hall to hall, running to register for classes, and a loss of five pounds.

Dorm choosing is no easy task for an entering freshman, especially since any information that would help arrives after the preference card has been sent in. If a freshman isn't next to construction, doesn't have a fouled-up sink or a pre-Boer War mattress, then he probably hasn't left for G.W.U. yet.

Advisor's are a great help, or so the handbook tells me. I wouldn't know. I saw my advisor once for five minutes. All he did was sign my cards and make sure I wouldn't have to come back again.

I only hope I can last the year, so that I can take some specific courses and guide some poor struggling freshman to the right path.

Phantom Freshman

THE WATCHER

WASTE ECONOMY

In today's affluent America, there is a disease worse than cancer overtaking us. In fact, maybe it's the most deadly cancer of all. This disease is enveloping rapidly every part of our daily existence. One of it's immediate effects is environmental pollution, but by far it's most deadly effect to Americans is mental pollution.

This disease could be called, for lack of a more distasteful name, the "Waste Syndrome". Economists would call it a mis-use in re-allocation of resources, politicians would say it's a necessary evil for the workers' welfare and business's progress, business would say this disease isn't as bad as it seems or say that it really doesn't exist at all, and the engineers will say they could find a solution to the problems, but no one has asked for it yet.

I would say that the economist has defined the disease properly in its physical effects, but has failed to educate the nation in a alternate economic philosophy, the politicians want to keep their jobs, so they won't step on anyone's feet, the businessman is a fool not to realize that his long-term profit margin will be destroyed due to this waste, and to the engineer, I would say, get out of your little back rooms in industry or government, and assert your solutions to the waste syndrome on society.

This ugly disease can be seen all through local, state, and federal government in the form of financial waste and duplication. Our federal government supports man-hour waste by farm subsidies, welfare, excessive import tariffs to support dying industries, and political favoritism in awarding governmental contracts to name a few.

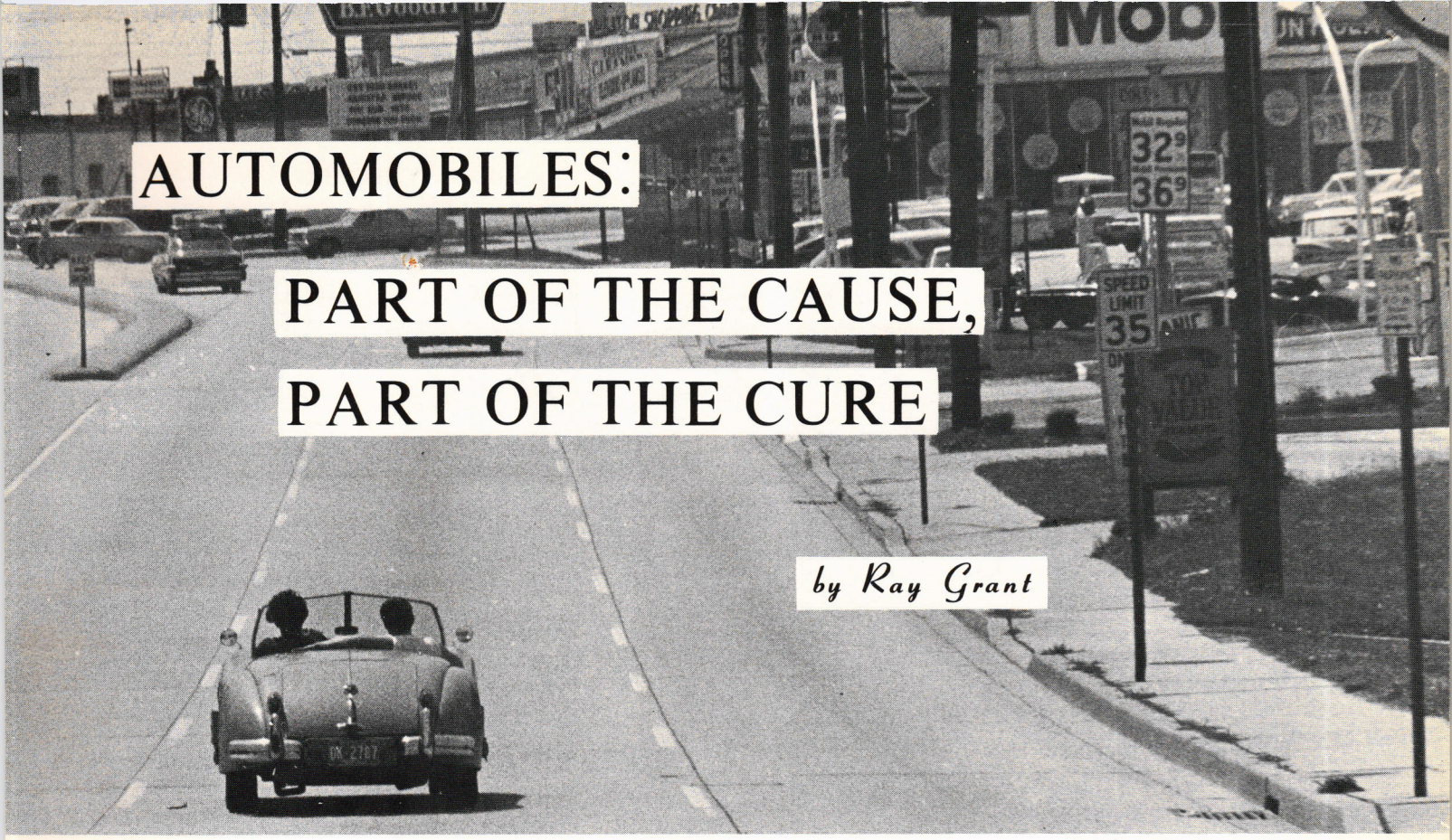
In business, we see such malignant tumors of waste as no-return, throw away glass bottles and non-cyclic plastic containers; planned obsolescence in the manufacturing of automobiles and many other consumer products.

But the worst effect of this disease, is that the American population accepts these gross inefficiencies created by the waste syndrome as a necessary product of an affluent society.

Well mister average American citizen, you are now beginning to see the results of the governmental and industrial waste economy; environmental pollution, inflation, recession, strikes, unemployment, and etc. This waste syndrome has been eating away at our progressive economy and technology until finally progress has stopped. And who is to blame for this assassination of the American ideal? You are; not the government or industry, but you. Because you are the government and the partners of industry. Your minds have been infected by the waste syndrome until you no longer think in economic and efficient patterns.

Is there a chance of salvation from this economic and intellectual suicide brought on by the waste snydrome? It's up to you.

THE MECHELECIV



AUTOMOBILES: PART OF THE CAUSE, PART OF THE CURE

by Ray Grant

There are people living in various urban areas of our country who awaken to the sounds of automobile horns and large trucks. They peer from their windows to the street below packed to the hilt with vehicles trying to make their way across the city. The urbanite then looks up to the sky that is always cloudy—24 hours a day, 365 days a year.

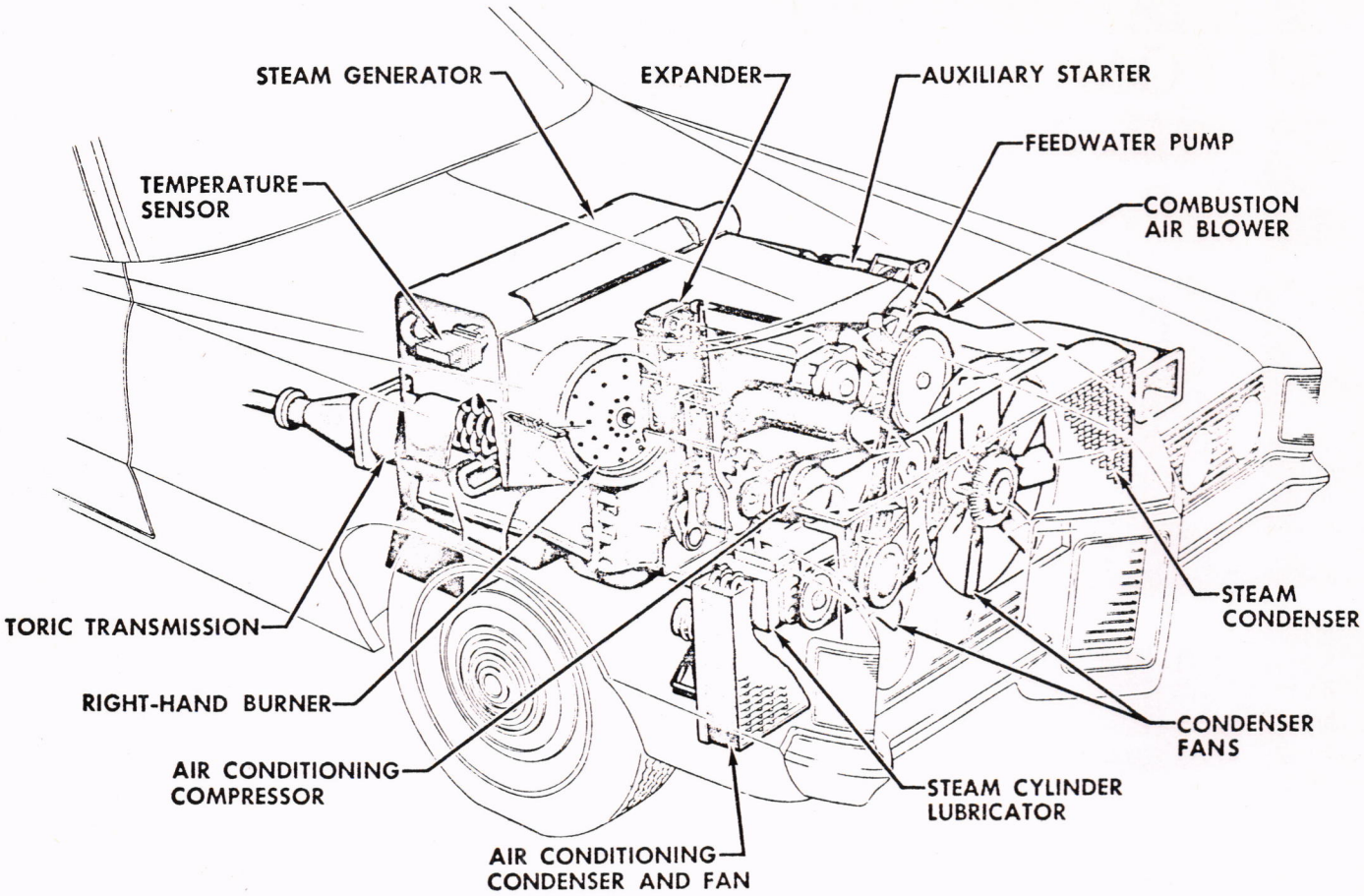
These are two big problems of our city today—overcrowded highways caused by cities and streets which are small being jammed by too many cars which are much too large and the cloudy skies largely caused by pollution of the air by automobiles. These two problems, if unchecked, will make our cities unlivable and will, most assuredly, spread throughout the country.

If present trends continue, the number of cars in 1980 will be double the number in 1960. By the end of the century there will be four times as many cars as there were in 1960. This also means that the vehicles on the road in 1980 will take up twice as much space as in 1960 and four times as much space in the year 2000. Anyone who has been in a five o'clock traffic jam knows that this increase will be unbearable. This increase in vehicles also means a corresponding increase in pollution which will most affect the cities as 93 percent of all auto trips are entirely within our cities.

The effects of air pollution on us and our environment are tremendous. According to Product Engineering: "Tests have shown that workers exposed to 5 pounds per minute(ppm) of carbon monoxide were unaware of any symptoms yet took longer to perform assigned tasks and made more mistakes." Yet the level of an expressway may be 15 times as high as that. Current health standards set 30ppm of carbon monoxide as the limit for human health, but Ralph Laisen of the U.S. Health Service says 5ppm should be the absolute limit. A study in Los Angeles showed that 95 percent of the carbon monoxide comes from motor vehicles. Of all airborne wastes, 60 percent comes from motor vehicles.

Air pollution also affects man's creations. In Strasbourg, France, the statues at the cathedral have been replaced by copies to prevent destruction by the city's air. Metals corrode faster and in many cities unusually high concentrations of pollutants have caused nylon stockings to dissolve. No one knows how many sets of tires have been damaged by air pollution. Meteorologists fear that air pollution could cause irrevocable changes in the earth's atmosphere. Many professional people profess that we have not yet scratched the surface as to the affects of air pollution.

If, beginning in 1968, all cars came with devices producing a 50 percent decrease in air pollutants, in twenty years air pollution levels would again reach present levels because of the increase in cars and the amount of fuel consumed; which is like running to stay in the same place. We need some kind of change in mode of transportation, particularly personal transportation; i.e., individual cars. We need changes in power plants in order to reduce air pollution. We need changes in size of cars in order to keep our cities from being more overcrowded than they already are and hopefully decrease the crowded conditions. We need to start experimenting now to find solutions to these



SE-101 Steam Car.

problems.

Some people have already started experimenting on several ideas for power plants and different types of automobiles. General Motors, Westinghouse, Bill Lear and others have been experimenting with various ideas. Electric, steam, internal combustion, and hybrid gas electrics are being tested as to their value and feasibility for use to power cars. General Motors has also been experimenting with various types of cars, several of which are small commuter types using experimental power sources and some which are standard production models modified with experimental power.

The type most favored by anti-pollutionists is electric power. Electricity is absolutely emission free and offers other benefits. The electric motor is an extremely simple piece of machinery with only one moving part. It eliminates the costly automatic transmission of today's passenger car as well as the cooling system, exhaust system, and differential. It has a higher rate of acceleration and uses no fuel at a standstill because the motor does not run. However, a tremendous amount of fuel, in the form of batteries, is needed while the motor is running. One car built by General Motors has a range of 47 miles at 30 miles per hour before the battery needs recharging. The problem with electric cars is providing enough power in the form of batteries to propel the car at reasonable speeds for long distances – that is, distances comparable to a modern-day car with comparable power. With conventional lead-acid batteries, in order to make an electric powered Volkswagen with performance equal to a gasoline-powered Volkswagen, a second Volkswagen full of batteries is needed. In order to build an electric car that is feasible for consumer use, a new type of battery is needed. So far there have been no new developments which are both economically and technically practical. Until such a battery is developed, the electric car will remain a dream.

Faced with the absence of a practical power source, some experimenters have been working with the steam

engine. The steam engine offers advantages over a gasoline engine such as cheaper transmission system, cheaper fuel, less parts, and a tremendous decrease in air pollutants. It, however, has many disadvantages, which will be very difficult to overcome economically. There is no fluid which will turn to steam at a low enough temperature for vehicle safety and yet not freeze in normal winter weather. It requires extremely complex and expensive controls. General Motors placed an experimental steam engine in a 1969 Grand Prix which then required a seven inch extension of the engine compartment, was 450 pounds heavier than the engine it replaced, and produced less than half the horsepower. Cost can not be determined, but it is predicted to be about twice as much as a gasoline engine on a comparable mass production scale. All of these drawbacks tend to lessen the practicality of a steam powered car.

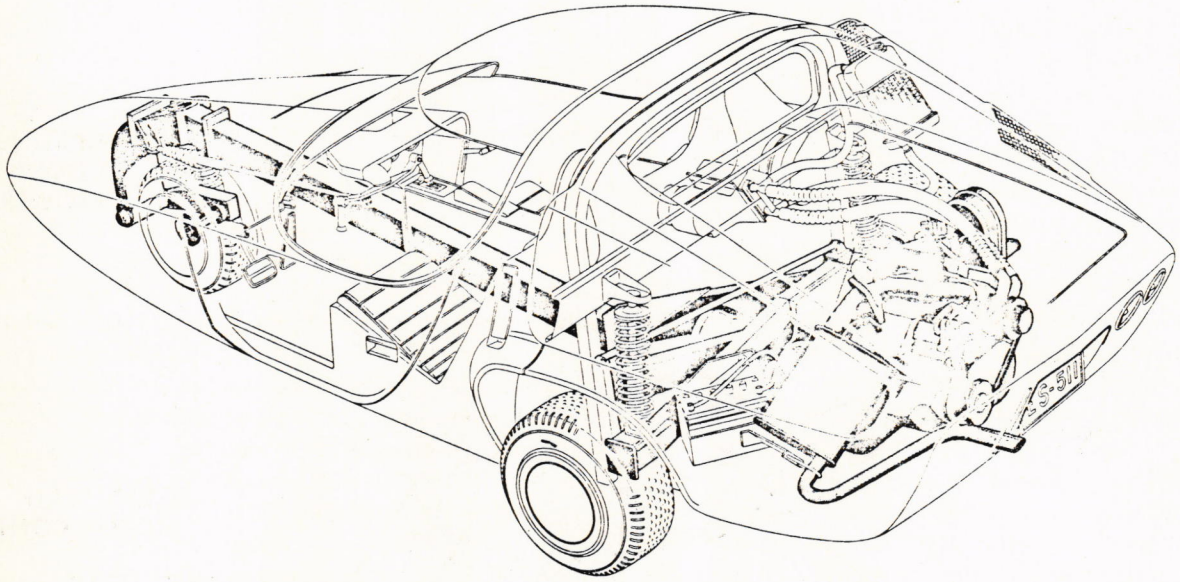
The power source which will probably be around for many years is the old, reliable reciprocating internal combustion engine powered by gasoline and diesel fuel. The internal combustion engine has lately come under attack because of its exhaust emissions, yet it is the most economically practical form of power today. The internal combustion is the standard which any new form of power must meet. The emissions are objectionable, but experiments are being made with such things as electronic fuel injection and other modifications which will hopefully reduce air pollutants to an acceptable level. Also, the cost of modifying the internal combustion is considerably less than developing a totally new concept. It is, therefore, quite probable that the internal combustion engine will remain for quite some time.

Another form of power which is quite revolutionary is the hybrid gas-electric power plant being tested by General Motors. The power plant combines both gasoline and electric power in such a way that the car is accelerated by the electric motor while the gasoline engine drives the car at steady speeds – with air pollutants at a minimum. It offers the advantage of less emissions than a conventional gasoline engine and a greater cruising range than an electric car.

One test as to the usefulness of these power plants is whether or not they can be applied to actual vehicles. The General Motors Corporation has a series of experimental cars using the various power plants. These automobiles show what is technologically feasible and are test beds as to how economically practical these ideas are.

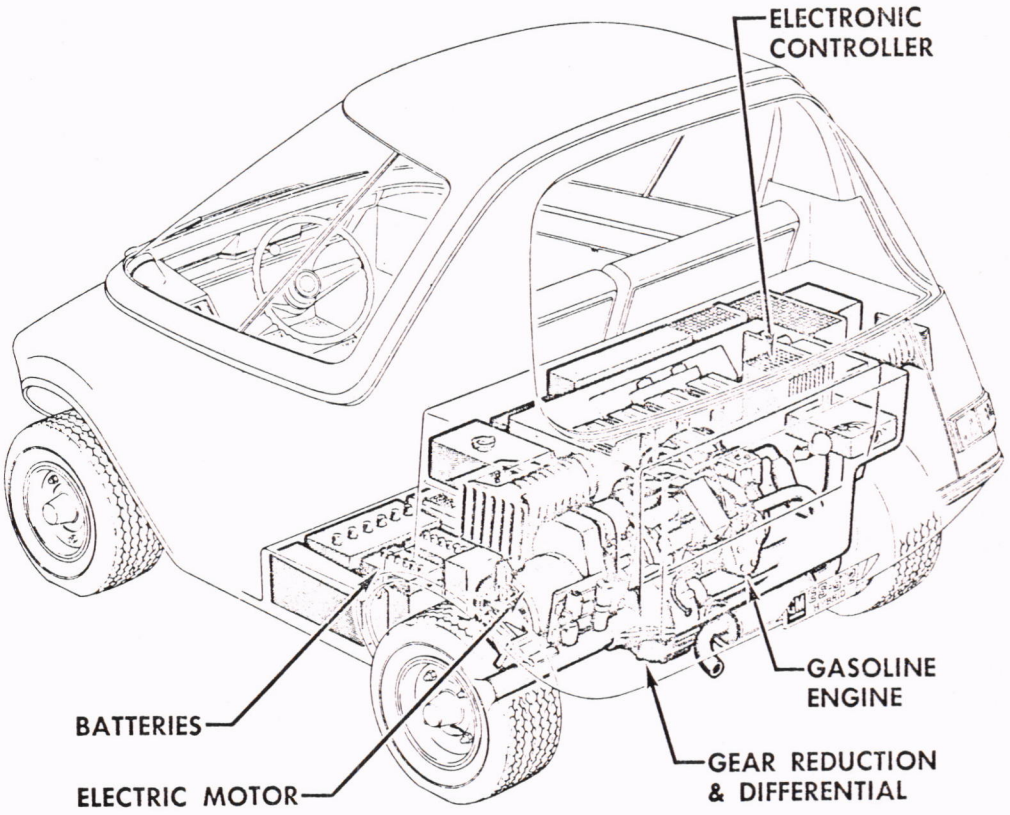
The GM-SE-101 steam car is the world's first steam car with complete power accessories, including air conditioning. It was developed to evaluate a steam engine in an automobile with a reasonable degree of passenger comfort, reliability, performance, and economy. The entire steam power plant is housed under the hood of a 1969 Grand Prix. The problems encountered with the SE-101 are the same as the general problems of the steam engine described previously.

The GM-511 gasoline commuter car is a unique three-wheeled vehicle with a conventional internal combustion Opel powerplant. The car was designed as a two-seat urban behicle to combat limited highway space. The car is 149

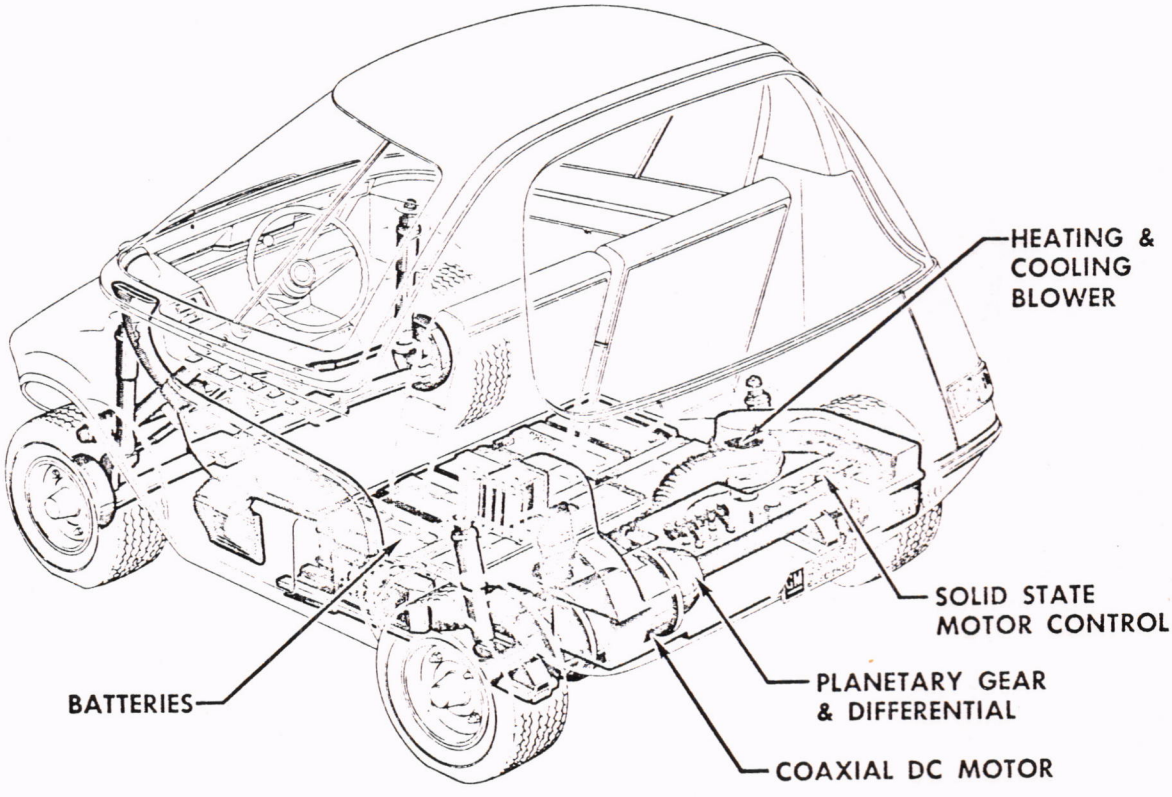


511 Commuter Car.

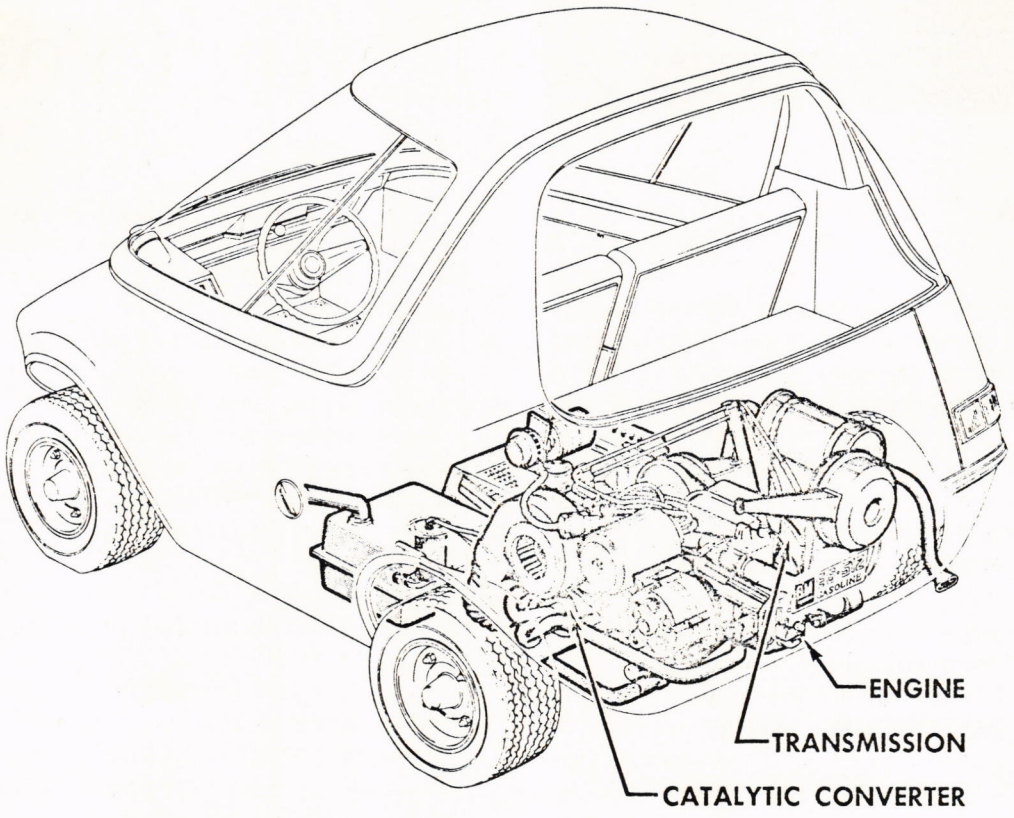
512 HYBRID



512 ELECTRIC



512 Gasoline Car.

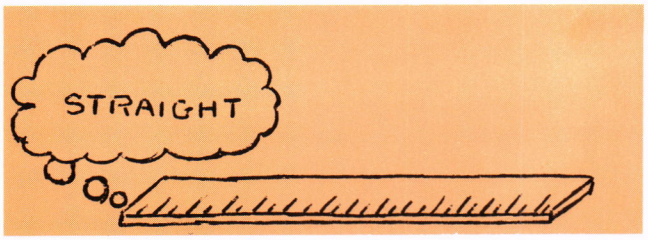


inches long, about 10 inches shorter than a Volkswagen.

The third and most important GM experimental car is the 512 urban car. This is a car whose basic design is altered to accept three types of power; gasoline, electricity, and hybrid gas-electric. These cars have a conventional four-wheel design, but they are only two-passenger and are intended for limited urban transportation. All three cars have a 30-40 mile per hour top speed. The gasoline-powered vehicle has the longest range of 280 miles while the electric car has a range of 47 miles. The hybrid has a range that varies from 5 to 150 miles depending on driving conditions. However, the driving range of the electric car could be drastically changed by the invention of a new type of power supply.

The optimal powerplant for the elimination of air pollution is the electric vehicle. The electric vehicle depends on one thing – the development of an adequate power supply. The steam engine seems to be second best with regard to eliminating air pollutants, but it has many other problems. The internal combustion engine can be modified to compete with the steam engine in pollutant levels and be much more economically feasible. The hybrid is too new but could be the answer to lowering pollutant levels of the gasoline engine and increasing the range of the electric powerplant. The hybrid could be the great compromise.

Of all the things stated up to this point, one thing is certain. We do need some kind of check on air pollution for the safety of our environment. The point is that we must act and we must act now. Our cities are terrible enough without letting the situation get worse. On March 26, 1969, Senator Petris of the California State Legislature introduced a bill barring all internal combustion engines in the state of California as of January 1, 1975. I don't think that this type of legislation is necessary, but maybe our cities are going to have to require that only cars of a certain size be allowed in the city limits; thus relieving the congested streets and reducing air pollution simply because small cars emit less air pollutants than big cars. An alternative solution would be to construct large public transportation systems in our cities and suburbs thereby eliminating the need for short trips in the family sedan. In short, we must reduce or eliminate the causes.



THINK ABOUT IT, WON'T YOU?

COMMENTARY

Bruce Nixon EE

A society is nothing more than the collective desires of the individual. American society was, perhaps wrongly when one examines the state of the culture and the condition of the environment, founded largely on the rights of property.

The idea of strength in progress through industry and technology, the drive for power by industry, and the image of success among the *nouveau riche* and the solid middle class brought about by gradual industrial growth has resulted in a very peculiar consciousness in American society. Americans seem to have willingly accepted technology, and the bureaucracy that developed out of it.

Industry and technology are moving so rapidly today that its momentum seems rather difficult to control. One wonders if it is in the power, or the conscience, of the American people to apply any control before it destroys them.

The power to save the environment lies in a very great, very conscious effort by the part of the American people. Although the President has granted federal aid to environment conservation programs, it seems doubtful that any real progress can be made until the fantastically expensive Vietnam war is over and environmental projects can get the federal attention they need. Therefore, all Americans must be brought to fully recognize the situation and then be willing to act.

"If you're not part of the cure, you're part of the problem."

WE'LL SURVIVE POLLUTION, BUT LIFE WILL CHANGE

Boyce Rensberger; Knight Newspapers

Perhaps the worst thing that will happen to us as the environment continues to deteriorate is not that we will all die but that we will live.

There is substantial evidence that humans are a highly adaptable animal, able to survive in the most miserable, degrading and unhealthy of surroundings.

There is an experiment that anyone can do easily to demonstrate what may happen.

Take an animal, say fish, and put a few in each of two identical tanks of pure water. Over a period of days, to one tank add small quantities of garbage, garage floor sweepings, dirty dishwater and the like.

While you are doing this, set aside equal quantities of the same stuff and after a week or two, dump the saved pollution all at once into the other tank.

The experiment has been done many times with many species and what happens is always the same. The fish that get gradual pollution adapt and remain alive though they are not terribly healthy and one might guess, not very happy.

They will even learn to eat the garbage and to change their behavior in several ways to accommodate the pollution.

* * *

Although the doomsayers of the environment crusade, including a few legitimate scientists who used to know better, have convinced some people that mankind is about to succumb like the second tank of fish, it probably won't happen.

Life, even human life, has an extraordinary ability to adapt to changing environments, even if it means the species has to change itself to do it.

There is physical adaptation of the kind that produced DDT-resistant flies and bacteria immune to penicillin.

And there is cultural adaptation that puts gas masks on children at play and which grinds out situation comedies to replace the lakes and the forests.

The poisons of our time will undoubtedly sicken and kill some of us – they already have – but most of us will adapt. Like cigarette smokers unaware of their cough, we will anesthetize ourselves to the pain.

And, as we die unspectacularly, we blame medicine for not keeping us alive longer.

* * *

The population explosion may be the one environmental hazard that we will be unable to control before it reaches disastrous proportions.

As the world and the United States and Michigan and Greater Detroit become more and more crowded, our methods of adapting are likely to deprive us of more of the dwindling supply of natural and spiritual resources.

In dozens of little ways we will never think of as bad, we will accept a lower quality of life simply because not

enough people are willing to restrain the quantity of it.

To say that we will adapt is not to imply we will be unaffected. Adaptation requires change. And there's not much to suggest that the changes we will undergo will increase human happiness or personal dignity.

We will not all be wiped out. After all, Calcutta is filled with live humans.

WHAT'S RIGHT WITH AMERICA?

Excerpts of Remarks by
Richard Nixon, President of the United States

Consider the problem that has been so much on the minds of many of our young people, and older people who have any sense of perspective of history and what could happen in the years ahead – the problems of the environment.

As I flew by helicopter from Scott Field here today, I looked down on the tremendous industrial corridor that surrounds the great city of St. Louis. I saw smoke coming from some of the factories. I remembered that in my time when you had smoke coming from factories that was a good sign; it was a sign of progress; it was a sign of jobs; it was a sign of production.

But times have changed. If I can put in symbolic terms, as far as the factory is concerned, what we need to do is increase the jobs, increase the production and eliminate the smoke.

My friends, that is why, as we look ahead ten, fifteen, twenty years from now, we can have the most productive economy in the world, but we will have cities that are choked with traffic, suffocated by smog, poisoned by water and terrorized by crime – unless we act NOW.

It doesn't need to be that way. There is no fundamental contradiction between economic growth and the quality of life; there is not inherent conflict – for a wise and civilized nation – between prosperity for our people and preservation of our environment. To have one, we not need forsake the other. That is why we have presented to the Congress an historically new program to clean up our water and our air, and to provide the open spaces which are the heritage and should be the heritage of every generation of Americans.

CAN GW BECOME 'CAL TECH EAST'?

THIS MAN SAYS

YES

EDITOR'S NOTE

Coming back to SEAS this Fall, the GWU engineering students have noticed that the basic engineering departments have been renamed: The Department of Electrical Engineering is now the Department of Electrical Engineering and Computer Science; the Department of Engineering Mechanics is now the Department of Civil, Mechanical, and Environmental Engineering; and the Department of Engineering Administration is now the Department of Engineering Administration and Operations Research.

Two new department chairmen have also been chosen: Dr. Walter Kurt Kahn is Chairman of the Department of Electrical Engineering and Computer Science, and Dr. William Henry Marlow is Chairman of the Department of Engineering Administration and Operations Research.

Behind these name changes and appointments there is something of great interest to the students, the School, and the Washington community, tangible evidence of the efforts to enable SEAS to develop into a top quality engineering school.

Although the topic of this issue of MECHELECIV is environment, the editor feels that this reprint from the Evening Star warrants insertion in this issue since it shows how SEAS, under the leadership of Dean Liebowitz, is preparing to meet the challenge of environmental pollution with positive solutions made possible by progressive organization and direction.

Greg C. Eichert

Editor-in-Chief

Harold Liebowitz sits in his engineer-neat office and forecasts the day when George Washington University will be recognized as the Cal Tech of the east, or the MIT of the south, analogies which do not seem at all implausible in the light of developments.

Such is the confidence of a man who only 2 1/2 years ago took over as dean of the School of Engineering and Applied Science (SEAS). And it comes less than four years since GW President Lloyd Elliott's Advisory Committee branded the school as second, if not third, rate.

Yet there is no trace of braggadocio as Liebowitz tells how things are changing at the downtown university, nor is

there need for it from one whose achievements in 47 years border on the incredible. His contributions in the fields of fracture research, deep sea submersibles, high-speed airplanes and Polaris missile propellants – to mention a few – clearly define him as a pragmatic engineer.

Most of these feats were accomplished during 20 years with the Office of Naval Research, with frequent side trips into the academic and industrial worlds. When George Washington called him he knew, perhaps as well as Chairman J. Herbert Hollomon's advisory committee, what fallow ground he was about to cultivate.

As the Hollomon report has pointed out, here paradoxically was the richest untapped lode in the country. In the Nation's Capital, the heartland of research and development (more than 230 such organizations) there was not a first rate engineering school within the six major universities.

Pulling no punches, the Hollomon group criticized SEAS' substandard facilities, the well-meaning but little-known and underpaid faculty, the ill-defined curriculum, poor departmental organization and inferior accreditation.

Committee reports as a rule lapse into limbo, but Liebowitz has seen to it that the Hollomon criticisms are being countered with positive action.

DRAMATIC READING

The story of how he is harnessing the region's resources – governmental research programs and grants, the huge reservoir of graduate students, the potential for earn-and-learn cooperation projects – makes dramatic reading even when boiled down to bare essentials, such as these:

Improvement of SEAS' physical plant with $1 million worth of equipment, including an electron microscope, EAI Model 589 advanced analog-hybrid computer and fully instrumented wind tunnel.

An increase in research grants from $160,000 to nearly $1.5 million.

A 23 percent upturn in enrollment, bringing the total to 300 undergraduate and 1,500 graduate students.* Liebowitz aims for a 100 percent increase in the next freshman class.

*Several typographical errors appearing in the original have been corrected in this reprint. Asterisks indicate where changes have been made.

Full four-year academic accreditation compared with provisional one, two and three-year recognition only three years ago.

A complete overhauling of the faculty, producing 13 new members of national and international reputation.

Establishment of a Material Science Laboratory, Microelectronics Laboratory and Soil Mechanics Laboratory.

Establishment of the Institute for the Study of Fatigue and Structural Reliability and the Institute for Management Science and Engineering.

In an aura of total commitment from President Elliott through the student body, Liebowitz has been "knocking on doors" seven days a week to perfect his program.

"I would not like to think of our school as soliciting," he says of the remarkable fund-raising. "I take the attitude that the academic institution has expertise helpful to the customer, whomever it may be – government or private industry. We are here to assist in joint ventures which will be mutually helpful.

Liebowitz's years of government service afford a natural

entree into what he regards as one of the school's fundamental roles – a close tie with government research and government employes.

"In the Washington area we have a special responsibility. Half of our students are government employes. We perform an educational and research service for these governmental activities, so I think this takes a particular type of curriculum. We must offer opportunities for government people who wish to improve themselves at part-time evening classes."

George Washington's surge surprisingly is coming at a time when other academic institutions are seeing both their federal grants and student enrollment being cut back. Which of course reflects creditably on Liebowitz's persuasiveness and organizational ability. The dean said he was

much concerned about the cutback in other schools "since we are in a technological era."

Liebowitz is virtually triangulating the Washington area with programs involving government laboratories and SEAS faculty and undergraduate students, who can earn up to $10,000 with on-the-job training.*

There's an exciting program at NASA-Langley Research Center, Hampton, Va., involving acoustics. This cooperative venture is bent on cracking its own sound barrier – discovering a remedy for the sonic boom and other noisy nuisances.

"I think the problem of the sonic boom can be overcome and that our laboratory will contribute to the solution," Liebowitz affirms. "This is a form of pollution and we are happy NASA-Langley has awarded us a contract to assist in training students in this area. The Navy also is interested in underwater problems, but just now we are concentrating on how we can live with aircraft with speeds of mach II and mach III."

Another innovation extremely valuable in the Washington area is a Continuing Engineering Education Program. In a day when rapidly changing technology requires updating of knowledge, the program offers about 100 short courses for practicing scientists and engineers.

At a time when some engineers are eking out a living driving cabs, Liebowitz is sanguine about the future of the profession.

"Of course there have been layoffs in engineering and in science," he admits. "But I feel some companies are taking advantage of the business turndown as an excuse to reorganize by getting rid of marginal personnel. Jobs are still available even if the applicant may have to search a little harder.

"The future of engineering is better, or will be better, than it has ever been before. Once we are past the present little dip, engineers will be needed to solve pollution and other environmental problems."

On the pressing matters of the environment and the cities, Liebowitz also is optimistic, with some qualifiers.

"I feel we have the technology today to solve the problems of pollution and environmental control, if we want to pay the price. Obviously I think we must find the time and money – even if it means exceeding the national budget by orders of magnitude – if we are to clean up the water, the air, the waste material. But it can be done.

"We have licked the space problem. That took a commitment by a president and a country. The present environmental problem, even more complex, will require a similar kind of commitment. But if we want to pay the price of afterburners for automobiles, or high temperatures from atomic energy for ridding waste material, we have that knowhow now."

Liebowitz called the urban problems the key ones today.

"But we have had some of these problems for years. As a high school boy in New York I thought I was fortunate to find a job paying $12 a week. Compared to that, job opportunities are good today."

COFFEE HOUR

Liebowitz has sought to create a climate in which there is a free exchange of ideas, sometimes in the relaxed atmosphere of a daily coffee hour.

"I have a policy that a student can see me anytime. I want the student to have a say-so, to have a strong in-put into the school. But he should not try to manage the affairs of the school.

"The students here are a job – the way they walk, the way they dress, the pride they show in themselves. We are always trying to get to know them better."

Perhaps because of his long research and many developments in military-related fields, Liebowitz has strong views about the university's role in defense-oriented programs.

"There is a need for a dialogue on the roles universities play with private industry and governmental laboratories.

"I am not happy with the status quo and the onesidedness which we are seeing at the present time on behalf of students as to what they think the military is.

"A person has a right in an academic institution to a contribution to the defense of his country, and it is an infringement of academic freedom for a student to think he has the right to stop someone from these objectives."

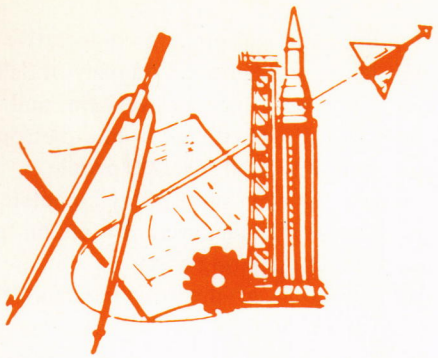
Liebowitz's pre-George Washington career encompasses an astounding number of successes. He is regarded as the foremost authority on fracture research, the science of determining metal strengths and weaknesses, tremendously important as applied to today's huge, high-speed planes. His achievements here include a seven-volume advanced treatise also published in several other languages, including Russian.

He has contributed toward the design of new high-speed aircraft, proved the feasibility of deep-ocean submergence for combat vehicles, directed the program on new reinforced solid propellants for Polaris missiles, and led the movement for lighter, higher performing submarines, to name a few accomplishments.

Among many awards was one by the National Science Foundation for developing the undergraduate and graduate curricula in structural and solid mechanics.

As to George Washington's present curricula, Liebowitz says it is "as fine as you will find in the country, completely revised and reorganized under lines of authority that answer the Hollomon report. We have expertise in some areas today which will match Cal Tech or MIT or any place else across the nation."

Article by Herman Schaben, Star Staff Writer. Reprinted by permission of the Evening Star, Washington, D.C.



TECH NEWS

Edited by Gregory D. Smith, E.E., '72

ASCE SUPPORTS PRESIDENT NIXON'S REORGANIZATION OF FEDERAL ENVIRONMENTAL PROTECTION AGENCIES

The American Society of Civil Engineers has endorsed and supported President Nixon's plan to reorganize federal efforts to protect and improve the environment. The ASCE statement was intended to "reflect the measure of concern and the involvement of civil engineers in American society, far beyond their role as masters of the earth sciences and the design and construction of structures for public use. The civil engineer is basically involved with providing ways and means of applying natural resources to human needs – and doing so in such a manner as to preserve and enhance environmental quality."

The 65,000-member Society said that "Basically the reorganization will result in staff, policy and overall monitoring of environmental matters in the Council on Environmental Quality (CEQ) and two operating agencies: The Environmental Protection Agency (EPA), which will conduct research and establish and enforce anti-pollution measures as an independent agency; and the National Oceanic and Atmospheric Administration (NOAA), which will exercise leadership in developing a national program of oceanic and atmospheric research and development as part of the Department of Commerce. This arrangement should result in a basic framework that will minimize existing redundancies and fragmentation."

". . . When policies are being made, or programs set in motion aimed at protection of the environment, the persistent advice of this and other professional societies seems sound: Include in policy level those who have made careers of problem solving.

"This Society (ASCE) has expressed concern that the resulting uncertainties about objectives and about operations have been accompanied by a growing loss to federal government service of highly qualified professional personnel. Uncertainties have carried outside the Federal government, resulting in delayed programs of research and application, escalation of costs for provision of needed facilities, and alienation of public support. An interesting aspect of the latter is the traceable effect of such alienation upon efforts to attract the necessarily able young people to undertake the preparation for careers of service in civil engineering and environment-related professions.

"It is not enough to state and restate that the air of our cities is a hazard, the water of our streams has long lost its aesthetic properties and that land is contaminated. Now is the time for action.

"It is the position of the American Society of Civil Engineers that the extensive reorganization of Federal agencies dealing with environmental protection and improvement can attain new levels of service to the nation, if systems of selectivity in the utilization of professional manpower are evolved and allowed to function effectively and without restraint."

ABANDONED AUTOS: RESOURCE OUT OF PLACE

The automobile is the basis for over 800,000 businesses – one out of every six in the United States. These businesses employ nearly 14 million of our people.

In 1968 there were more than 100 million registered vehicles in the country. They traveled over one trillion miles and consumed 90 billion gallons of gasoline.

The Federal excise tax paid by owners and operators of motor vehicles in 1968 amounted to $6 billion.

Sixty per cent of all rubber, 20 per cent of all steel, 10 per cent of all aluminum, over 7 per cent of the copper, 13

per cent of the nickel, 35 per cent of the zinc, and over 50 per cent of the lead consumed in the United States is for automotive use. And every one of these materials is one for which our national need is growing.

At the same time, the rate at which cars are scrapped – about seven million passengers cars last year and over one million trucks and buses – has reached a point that the aesthetic problem of unsightly graveyards and abandoned, rusty hulks is increasingly a matter of public concern.

Although discarded auto hulks constitute only a small fraction of the waste disposal problem in terms of tonnage, they are higher in metal values than most waste materials. They offer a tremendous incentive for the 33,000 auto wrecking yards and 1,800 scrap processors currently operating across the country. With the aid of these excellent facilities, the problem can and must be solved.

CURRENT RESEARCH

The Bureau of Mines currently is actively engaged in research on converting old automobiles to metals suitable for recycling to industry.

Just recently the Bureau published a report which describes the results of research on the dismantling of junked automobiles to produce high-quality scrap. All components of 15 scrap automobiles procured from wrecking yards, scrap processors and insurance salvage firms – these were cars that were manufactured between the period of 1945 and 1965 – were dismantled, separated into various components and analyzed. From the information obtained it was determined that a representative junked automobile weighing 3,600 pounds could be expected to yield approximately 2,500 pounds of steel, 500 pounds of cast iron, 32 pounds of copper, 54 pounds of zinc, 51 pounds of aluminum, and 20 pounds of lead. The remaining 400 pounds consisted of non-metallics.

These are all valuable materials, and our requirements for them are constantly growing.

The Bureau had time and motion studies made, and it was found that a typical vehicle could be economically burned in a smokeless incinerator and handled, dismantled, and the shell could be baled into a high-quality bundle containing less than 0.1 per cent copper. A cost evaluation study showed that such an operation could provide an annual rate of return on invesmtnet of about 20 per cent.

SMOKELESS INCINERATOR

The smokeless incinerator is also a Bureau of Mines development, and it makes available to the scrap processing industry a low-cost way to avoid air pollution caused by open air burning of scrapped cars.

Developed by Bureau engineers in a co-operative effort with the Wasatch Metal and Salvage Company of Salt Lake City, Utah, it is a relatively inexpensive item, and it can efficiently process all the junked cars from a metropolitan area with a population of around 300,000 people.

Preliminary testing has been successfully completed, and further testing already is under way to obtain precise information on optimum operating costs.

The principal attraction of the new incinerator is its construction cost of only $22,000. This is roughly one-tenth the cost of smokeless models now commercially available.

We are confident that it will stimulate interest among scrap processors whose open-air burning practices are being increasingly restricted.

Capable of processing 50 cars every eight hours, the new incinerator can burn two cars at a time, utilizing an after-burner to eliminate smoke and fumes. Combustion gases are then vented to the atmosphere through a 54-foot stack. The effluents meet or exceed most clean air standards.

Once burned, the junked automobile can be processed in the usual manner for its metal values and the scrap sorted, baled, or bundled.

OTHER PROJECTS

Bureau laboratories also are working on the problem of grading the non-metallic, non-ferrous rejects from shredding operations which are being generated currently at the rate of about one million tons annually. Aluminum, copper, zinc and lead constitute about 30 per cent of this reject.

For the most part, these valuable non-ferrous metals are being wasted because no practical method has been devised to separate and recover them.

Recently the Bureau developed an air separation method which will yield a rich concentrate of metallic constituents from this residue. The concentrate, which is 84 per cent metal, contains 97 per cent of the non-ferrous content of the residue.

The process is not perfected yet, but there is every indication that its efficiency can be improved through additional research.

Meanwhile, our researchers have developed a method that can be used to recover copper from starters, generators, armatures, and similar high-copper automobile components. This process looks very much like the solution to a troublesome and time-consuming problem for scrap processors.

In it, scrap material to be stripped of copper is dipped in a molten salt – calcium chloride – and agitated briefly. The bath does not affect the iron and steel scrap but quickly melts the copper even in small holes and crevices. The

copper collects in the bottom of the vessel and can be easily drained off. About 99 per cent of the copper can be reclaimed in this manner.

The process is economical, since the salt is cheap and can be re-used.

DISPOSING OF OLD TIRES

Another research project is the Bureau's recently developed process for disposing of old tires. Some 100 million of them are now being discarded every year. Strung out tread to tread, they would circle the earth twice at the Equator.

But the problem is they aren't strung out. They are piled in heaps of trash and junkyards across the country, or worse, they are burned in the open, adding their volatile contents to an already polluted atmosphere. In cooperative work on an idea originally conceived by the Firestone Tire & Rubber Co., bureau researchers have been obtaining surprisingly large quantities of valuable chemicals, oils, gas and tar from old tires by destructive distillation techniques or, if you wish, carbonization in a heated reactor.

As much as 140 gallons of oil and 1,500 cubic feet of gas comparable in heating value to natural gas have been recovered from one ton of tires.

These are only a few of the examples of the ways in which technology can be applied to solve our solid waste problem and convert these so-called wastes into worthwhile resources.

Where technology has polluted, technology can purify. Our national eyesores can indeed become national interests.

Junked cars must never be looked upon merely as eyesores to be concealed or burned. From the national viewpoint, these vehicles are a major source of raw material, a resource out of place.

Automotive scrap is now generated at a rate that if totally utilized can provide industry with over ten million tons of ferrous and one-half million tons of non-ferrous metals annually, with every indication that this rate will increase.

This is a growing resource for a country and a people that will need it more and more.

By

Hollis M. Dole
Assistant Secretary (Mineral Resources)
Department of the Interior.

Westinghouse's answer to the environmental transportation problem with the new, no fumes, no noise, all electric bus.

WESTINGHOUSE ANNOUNCES 18-PASSENGER ALL-ELECTRIC BUS

Westinghouse Electric Corporation announced it has produced the largest all-electric passenger bus available in the United States.

"The bus is designed to carry up to 18 passengers," said R.L. Bell, manager of the Westinghouse Electric Vehicle Department which is headquartered in Redlands, Calif.

"Typical uses for the vehicle," said Mr. Bell, "include transportation within industrial complexes, shopping centers, college campuses and other activity centers where large numbers of people are required to walk long distances."

The bus is capable of operating for eight straight hours, making more than 500 stops and starts.

"Because the vehicle is all electric," said Mr. Bell, "there are no fumes, noise or other environmental pollutants to worry about. The bus's carrying capacity and long range make it an attractive alternative to internal combustion vehicles in high-density areas."

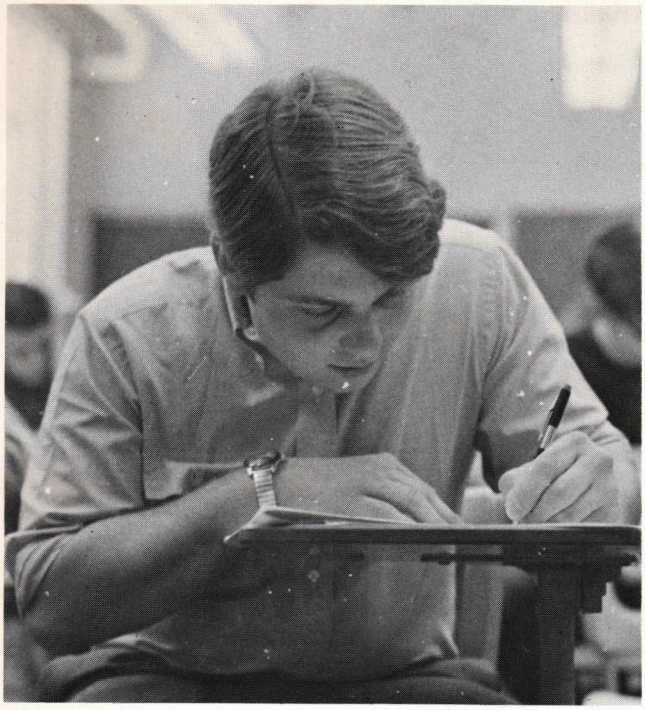
The bus can be licensed to operate on municipal streets although the vehicle's typical speed – 6-1/2 miles an hour with a full complement of passengers and nine miles an hour empty – would probably discourage extensive on-street use.

The new bus is 14 feet long, 5-1/2 feet wide and 7-1/2 feet high from road to rooftop. Power for the four-horsepower direct-current series-wound motor is provided by 12 six-volt batteries which produce 36 volts and 500 ampere hours. Two other six-volt batteries are used to power the vehicle's accessories.

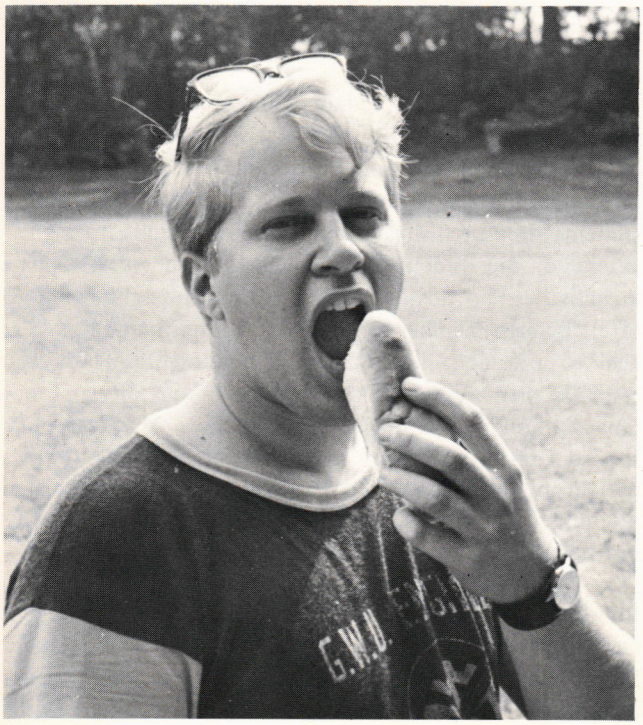
Board of Trustees at S.E.A.S.

Gee!! Only 3 of us, and 80 men.

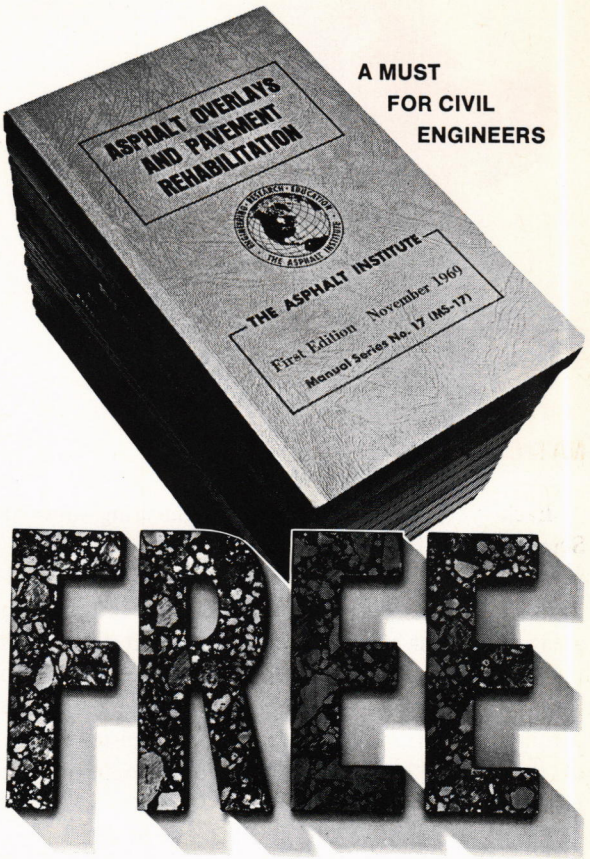
Oh,****



"What do I need English for?"
Not to join Mecheleciv.



Nothing need be said.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Campus News

NATIONAL ENGINEERS' WEEK

Each year, the School of Engineering and Applied Science presents an exhibition dramatizing National Engineers Week. This year's theme for Engineers' Week is "Engineering . . . To Improve the Quality of Life." Specific areas of interest following this theme that we are trying to reflect are current advances in medical engineering, environmental control, and educational techniques, as well as communications, data processing, and transportation. Each of these areas had and will continue to have important impact on today's society.

Several exhibits we have so far acquired are:

1) an APT ground weather satellite copier
2) a small office programable desk top calculator
3) a remote terminal for use in medical diagnosis
4) a look at the developing METRO subway system for Washington.

We are now working on obtaining exhibits using lasers in communications, art, medical research, and credit card protection. These exhibits were recently on exhibition at a special presentation on lasers at the Smithsonian Institution in Washington, D.C.

National Engineers' Week will be observed at G.W. from February 21-27, 1971. Each year the exhibit is open to the general public and is well attended. Any suggestions and/or offers of help will be needed and appreciated if this year's exhibition is to be a success.

Michael Seijo
Richard Tabor

A NASA display at G.W. during Engineers' Week.

THETA TAU FRATERNITY

Most Engineering students find that their time to participate in extra-curricular activities is very limited. However, a good college education should include a variety of students interests both in and out of the classroom. A students' like or dislike for his school depends, to a great extent, on the student himself. Unless a student takes part in activities, he misses much of what the school has to offer. Being a member of Theta Tau Fraternity adds a great deal to a student's enjoyment of school life. Theta Tau helps its members to make the most of out of classroom time without jeopardizing their studies. The fraternity sponsors many social and professional activities and takes part in the intramural athletic program. Students interested in joining Theta Tau should speak to one of the active brothers:

Bob Grant . . . . . Regent
Greg Eichert . . . . . Vice Regent
Steve Momii . . . . . Treasurer
Al Lee . . . . . Scribe
Bill Zeeman . . . . . Cor. Secretary
Elliot Lieberman . . . . . Pledge Master

Frank Atwood
Paul Blue
Jerry Bonn
Russ Chesley
Hugh Faust
Dave Forsyth
Ray Grant
Sid Harmon
Howie Kellman
Dan Holtsclaw
Bob Longson
Bob Lucas
Art Mitchell
Mike Rothschild
Jay Rubin
Greg Smith
Dave Sobel
Dick Tabor
Don Wallroth
Andy Williams
Mark Litchfield

32 STUDENTS MAKE SEAS HONORS LIST FOR SPRING SEMESTER 1970

The faculty of the School of Engineering and Applied Science recognizes meritorious scholastic achievement by an Honors List containing the names of candidates for undergraduate degrees whose scholastic achievement satisfies all of the following requirements: 1. The completion of a minimum of 13 semester hours in one semester, with the total number of hours in which the grade of A is earned being at least equal to the total in which the grade of C is earned. 2. No grade below C has been received during the qualifying period. 3. No disciplinary action has been taken in respect to the student.

Ibrihim A. Ashie
James Boland
Jerrold L. Bonn
Enzo Carruba
William G. Conover
Michael S. Cook
Kenneth D. Dampier
Robert W. Dannenfelser, Jr.
John C. Davies III
Alfred S. DeLuca, Jr.
Thomas E. Erickson
Dennis G. Gallino
Imad S. Golmieh
Paul M. Haldman, Jr.
Mohammed H. Hatoum
Robert E. Joseph
Klaus J. Kerl
Elliott B. Lieberman
Charles E. McCullough III
Steven T. Momii
Arshad Nawaz
Lars Pardo
Carroll A. Potter
Larry G. Rands
Robert D. Sadler
Thomas B. Schalk
Michael A. Seijo
David R. Sobel
John A. Sporidis
Stephen M. Tenney
Martin C. Trocki
Alan C. Waldron

TAU BETA PI

Tau Beta Pi association is the national engineering honor society whose purpose is "to mark in a fitting manner those who have conferred honor upon their alumni by distinguished scholarship and exemplary character as undergraduates in engineering, or by their attainments as alumni in the field of engineering, and to foster a spirit of liberal culture in engineering colleges."

Last spring the association elected new officers for the coming year:

President – Steven Momii
Vice President – James Bladen
Secretary – Jerrold Bonn
Treasurer – Paul Haldeman

The G.W. chapter of Tau Beta Pi will be represented at the national convention by Steve Momii on October 8, 9, 10 at Ohio State University.

A.S.M.E.

The American Society of Mechanical Engineers is a society composed of mechanical engineering majors. Here at G.W.U., the student branch of A.S.M.E. provides direction to those students in the mechanical engineering curriculum.

Last spring, the G.W.U. chapter elected two new officers: Christopher Kouts, Chairman; and David Forsyth, Treasurer. The election for the two other positions, (Vice Chairman and Secretary), will be held early in the fall with the hope that freshmen and sophomores will take an active role in A.S.M.E.

Our activities include outside speakers, student chapter conferences and field trips to points of engineering interest. For example, this fall we are planning a trip to the Naval Ordnance Research Center.

If you really want to know what mechanical engineering is all about – Join A.S.M.E.

I.E.E.E.

The officers of the G.W.U. chapter of the Institute of Electrical and Electronic Engineers are pleased to see the large freshman class and are looking forward to welcoming electrical engineering students into the organization. The purpose of the I.E.E.E. is to keep its members up to date on the developments in the field of E.E. and in related fields. This is done by presenting speakers, showing technical films, and conducting tours.

Anyone interested in becoming a member of the I.E.E.E. should visit the Electrical Engineering department for an application form. Applications are also available from any of the officers:

Chairman: Jerry Bonn
Vice Chairman: Steve Momii
Secretary: Jeff Jacox
Treasurer: Ray Ruben

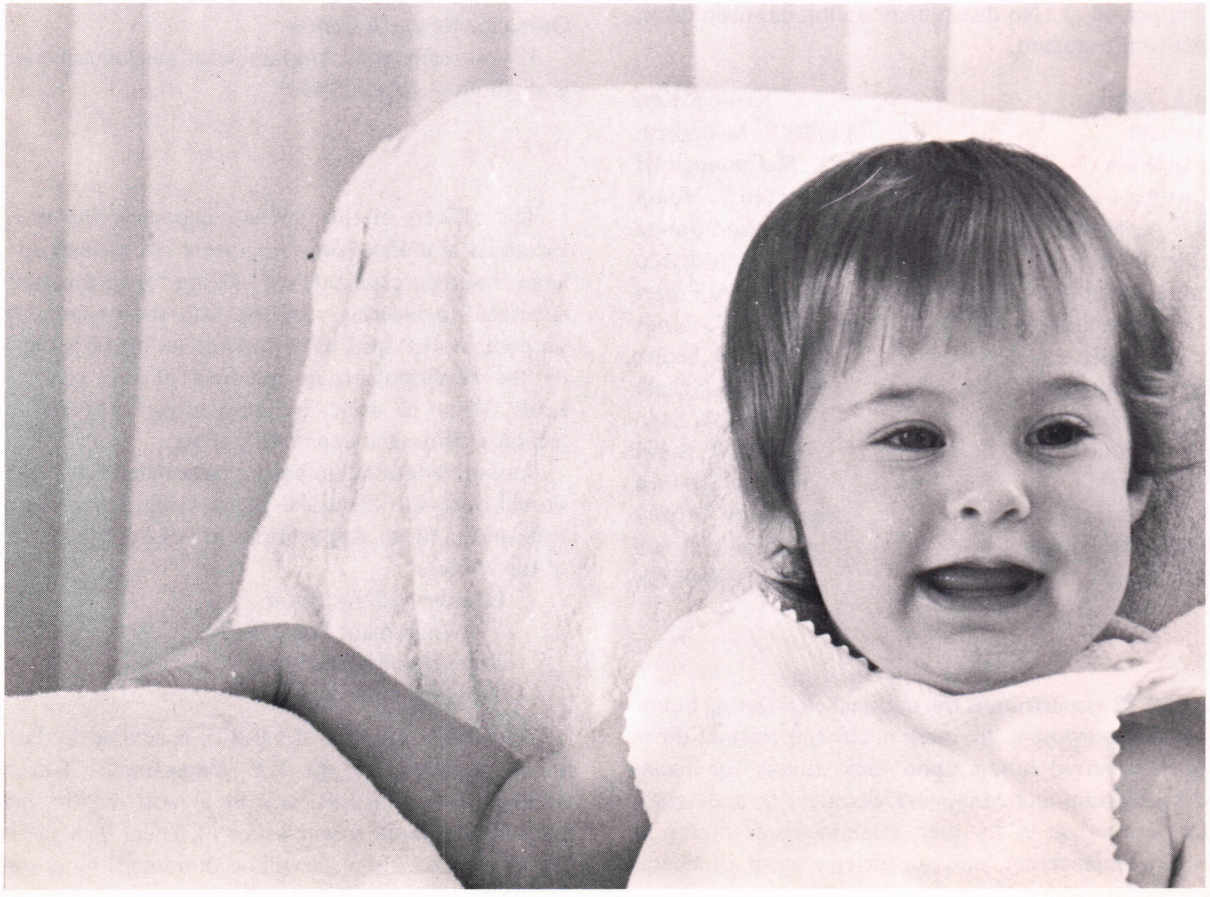
The G.W.U. chapter of I.E.E.E. is advised by Dr. Walter Kahn, Chairman of the E.E. Department. The opening activity of the I.E.E.E. will be a joint meeting with the professional development series of Theta Tau in October. The exact time and place will be announced by posters.

The I.E.E.E. needs your ideas, suggestions and support.

MECH

MISS

This month's Mech Miss is Sabrina Sobel. Her current major is quadruped mobility with a minor in gourmet food tasting. She has the outstanding measurements of 35cm-14in-35cm and is still developing! Her limited vocabulary and inability to read shows great aptitude for the engineering field.



Knowledge today is increasing at a rate that can best be described as following a curve defined by the equation $Y = a^x$. And we're just about reaching the steep slope of that curve.

We're not trying to discourage you. We're just suggesting that when you think about your career, you give some thought to how you're going to keep up with that curve.

One way is to consider Western Electric. We're an acknowledged industrial leader in continuing education for our engineers and supervisors. Our recently completed Corporate Education Center near Princeton, N.J., for example, has a resident staff of over 100, and offers more than 310 technical and management courses. It's the most advanced facility of its kind, and if you're with Western Electric you could be among the 1500 engineers and supervisors who'll be studying there next year.

The way we see it, sharp curves don't have to be dangerous. They can be pretty exhilarating.

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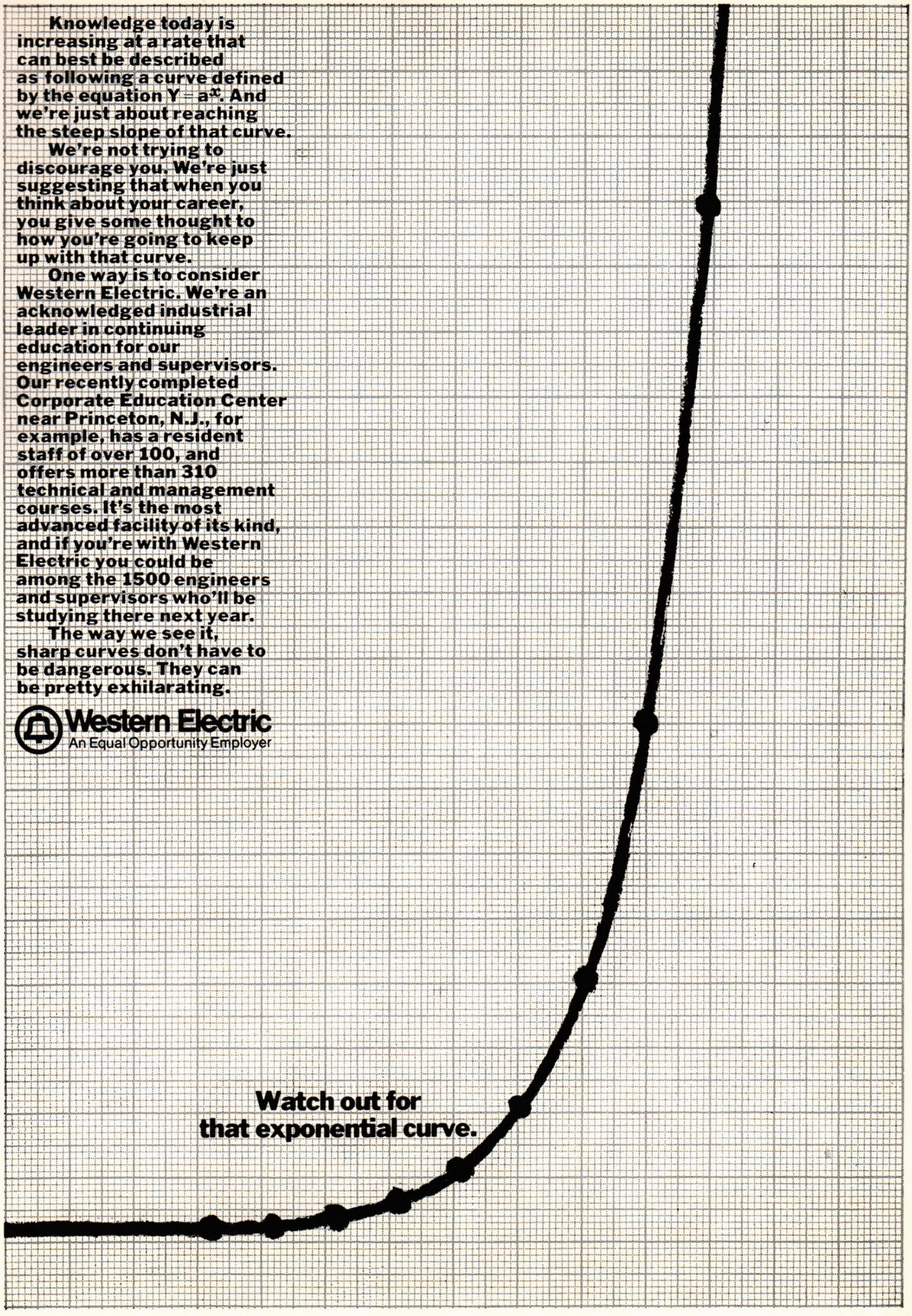

When you can hardly hear yourself think, it's time to think about noise.

Noise won't kill you. But before it leaves you deaf, it may drive you crazy.

Noise is pollution. And noise pollution is approaching dangerous levels in our cities today.

People are tired of living in the din of car horns and jackhammers. They're starting to scream about noise.

Screaming won't help matters any. But technology will. Technology and the engineers who can make it work.

Engineers at General Electric are already working to take some of the noise out of our environment. One area where they're making real progress is jet-aircraft engines.

Until our engineers went to work on the problem, cutting down on engine noise always meant cutting down on power. But no more.

GE has built a jet engine for airliners that's quieter than any other you've ever heard. A high-bypass turbofan. It's quieter, even though it's twice as powerful as the engines on the passenger planes of the Sixties.

And NASA has chosen General Electric to find ways of cutting engine noise even further.

It may take an engineer years of work before he can work out the solution to a problem like noise in jet engines. And it may be years before his solution has any impact on the environment.

But if you're the kind of engineer who's anxious to get started on problems like these and willing to give them the time they take, General Electric needs you.

Think about it in a quiet moment.
Or, better yet, a noisy one.

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